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Nigeria Cassava Value Chain Analysis



October 2012

This publication was produced for review by the United States Agency for International Development. It was prepared by Chemonics International Inc.

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MARKETS II

DRAFT

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Acronyms

ATA	Agricultural Transformation Agenda
ADP	Agricultural Development Program
CAP	Common Agricultural Policy
CRS	Catholic Relief Services
DRC	Democratic Republic of Congo
EU	European Union
GON	Government of Nigeria
Ha	Hectare
HQCF	High Quality Cassava Flour
IITA	International Institute for Tropical Agriculture
LAC	Latin America and the Caribbean
MARD	Ministry of Agriculture and Rural Development
Mt	Million metric ton
mt	metric ton
NAEC	National Agricultural Enterprise Curriculum
NASC	National Agricultural Seed Council
NCRI	National Cereal Research Institute
PIND	Partnership Initiative for the Niger Delta
SME	Small and Medium EnterprisesProcessors
USDA	United States Department of Agriculture

Executive summary

The MARKETS II project began in late April 2012 with the objective to increase the competitiveness of selected agricultural commodity value chains by strengthening linkages between value chain actors, improving access to inputs and finance, deploying and disseminating technologies to new users, and by building the capacity of all value chain actors through technical assistance.

MARKETS II builds off the success of the MARKETS (2005 – 2010) and Bridge to MARKETS II (2011 – 2012) projects. It is designed to go deeper in fewer value chains (four to five), and achieve greater impact. Furthermore, MARKETS II is expected to concentrate its efforts in up to ten key states. By concentrating its resources on a reduced number of value chains and states, USAID will be better able to assess its impact on targeted value chains and beneficiaries.

In May 2012, a number of selection criteria were developed to select value chains for further analysis. These criteria included low-entry threshold for women, youth, and vulnerable groups; the geographical spread of the commodity; the importance of the commodity in the GON Agricultural Transformation Agenda; the possibility of deploying new, low-cost technologies; and whether the commodity falls within the MARKETS II smallholder farmer mandate.

Based on this selection process, the following value chains were selected for further analysis: cassava, sorghum, rice, cocoa, and aquaculture. Maize and soybean were also selected as they are the main ingredients of fish feed, and the lack of quality fish feed is one of the primary constraints of the aquaculture value chain.

Teams of MARKETS II staff and locally hired value chain experts conducted field research using questionnaires with key informants and holding open ended focus group discussions with a large number of stakeholders including producers, processors, traders, input suppliers, service providers, and policy makers.¹

A series of half day validation work shops were organized with participation of a cross-section of the stakeholders surveyed. The methodology is described in further detail in Annex I.

Cassava Findings

The cassava value chain analysis produced the below findings:

- Nigeria is the largest producer of cassava but production is not competitive. Producers who rely on low input use and manual labor work at a loss. It is only after adoption of mechanized land preparation and the use of inputs, including improved varieties that farmers will start to make money.
- High farm gate prices for fresh roots make the production of high quality cassava flour (HQCF), starch, and other derivatives uncompetitive in Nigeria. Producers of HQCF and other industrial products cannot compete with imported products from countries like Thailand and Vietnam.
- Farmers prefer to sell their fresh roots to gari and fufu producers who can absorb high farm gate prices and transfer the cost to the consumers.

¹ A detailed description of the survey methodology can be found in Annex 1.

- Transportation costs are high due to the bulkiness of the products and the perishability of the fresh roots, which limits farmers' and processors' negotiation power with transporters.
- There is an emerging class of entrepreneurs who trade in fresh roots and who will even send in crews to harvest the cassava for farmers. These traders mainly supply gari and fufu processors on the "just in time" principle.
- The interviews and focus group discussions brought to light the different perceptions of the market constraints between cassava farmers and small and medium sized (SME) processors of food products. Farmers saw a lack of markets as a major constraint, the processors pointed to a lack of raw materials as the constraint.

Based on survey findings, participants in the validation workshops came up with strategic choices which will serve as guidance for MARKETS II interventions.

Strategy for improving the competitiveness of the cassava value chain:

- Lower farm gate prices by increasing productivity through the adoption of inputs and mechanization.
- Lower transportation cost by facilitating on-farm or in community based chip production and drying using existing low cost technologies.
- Create strong linkages in the value chain between farmers, processors, input dealers, and service providers.

Setting the scene

Feeding Africa

The world food crisis in 2007-08, during which food prices experienced their sharpest rise in 30 years, leading to food riots in many parts of the world, focused global attention on the importance of agriculture. After decades of neglect, investment in agriculture is now on the rise. A notable example in Sub-Saharan Africa is Malawi, which spent as much as 4.2 percent of its GDP on a fertilizer subsidy scheme that moved the country from being a net importer of grain to an exporter to the region. Unfortunately, the amount of the subsidy was not one Malawi could sustain in the long run.

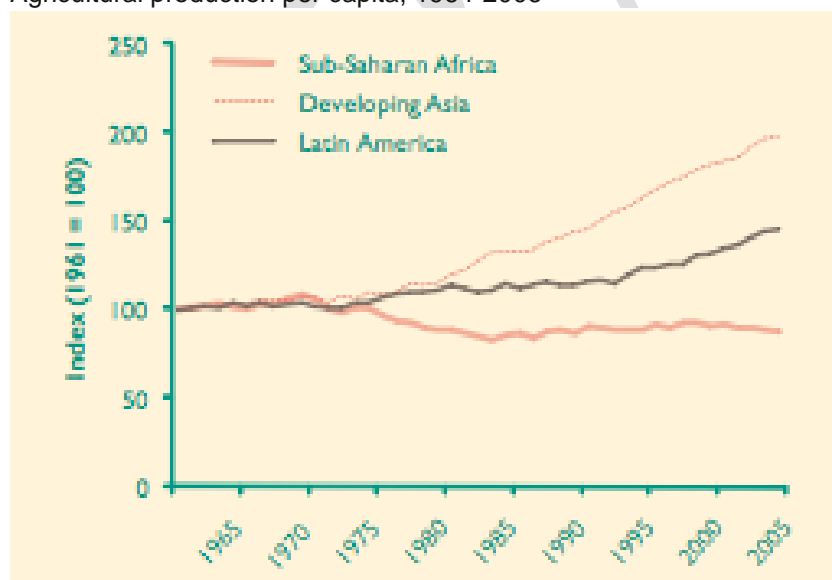
The Food and Agriculture Organization estimates that to keep pace with demand, developing countries will have to double food output by 2050. This amounts to a 70% rise in food production.

While the situation has temporarily eased, fundamental issues have not gone away. At the heart of the developing world's agricultural challenge is the basic issue that demand is rising faster than supply can keep up.

Population growth, urbanization, and increasing incomes are leading to a shift in consumption from grains to meat in developing countries, requiring greater grain production for feed. In parallel, demand for biofuels is consuming more of the grain production from the large grain exporting countries. On the supply side, land under cultivation has increased but is nearing saturation, and yield growth in cereals is declining, from three to six percent a year levels during the Green Revolution in the 1960s to nearer one to two percent today. In some developing countries, yields are flat.

Not even flat

Agricultural production per capita, 1964-2006



Since 1960, output in Africa has increased by 2.4%, while its population has grown at 2.6%, resulting in food aid requirements that are 4 times higher than other regions.

Source: The Economist; "Whatever happened to the food crisis"; June 2009

The Challenge According to Sachs

Writing about the state of agriculture in Africa, economist Jeffery Sachs summarizes the challenge and solutions:

“...many poor countries’...farmers are producing far below what is technologically possible.”

“Traditional farming uses few inputs and gets poor yields. Poor peasants use their own seeds from the preceding season, lack fertilizer, depend on rain rather than irrigation, and have little if any mechanization beyond a traditional hoe. Their farms are small, perhaps one hectare (2.5 acres) or less. Under traditional agricultural conditions, the yields of grain – rice, wheat, maize, sorghum, or millet – are usually around one ton per hectare, for one planting season per year.”

The key: “There is nothing magic about [a] combination of high-yield seeds, fertilizer, and small-scale irrigation.”

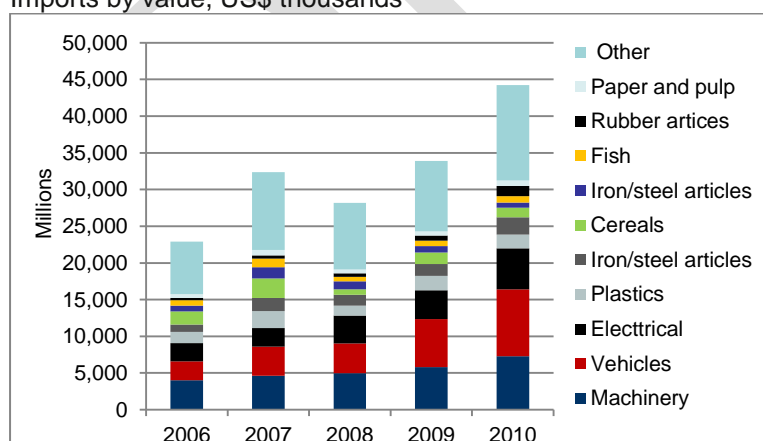
Nigeria’s Trade Patterns

Nigeria’s import base is expectedly diverse, as are its trading partners. While manufactured goods dominate its imports, food products – namely cereals and fish – also feature in its top 10 imports. Import substitution is therefore seen by policy makers as a driver toward achieving self-sufficiency in key agricultural commodities.

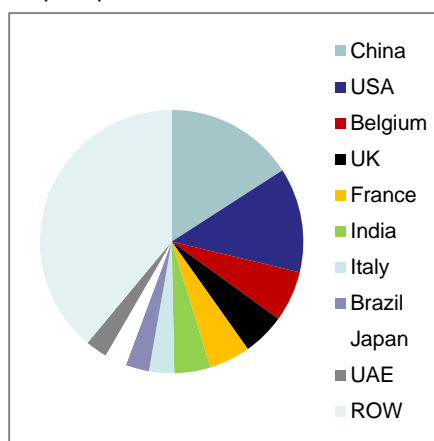
Oil is king, dominating Nigeria’s exports, enabling the country to run a trade surplus. If one excludes oil, this picture changes dramatically, with imports dwarfing Nigeria’s non-oil exports. Non-oil exports are indeed growing fast, at a rate of 80 percent a year, albeit from a negligible base, as Nigeria diversifies its economy away from dependence on oil.

Top 10 imports

Imports by value, US\$ thousands



Import partners, share of value



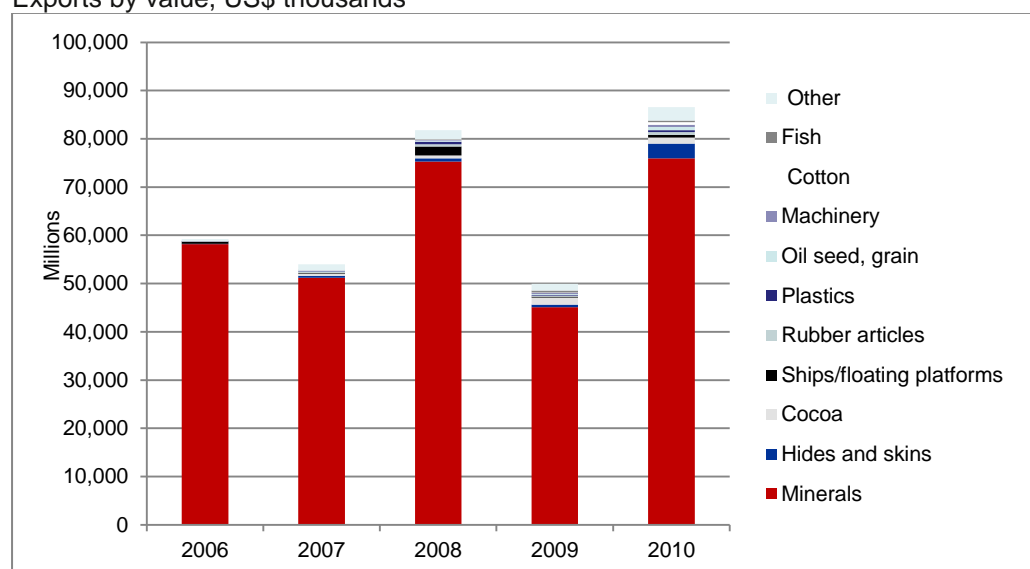
Source: ITC data, MARKETS II analysis.

A study that looked at the drivers of Nigeria’s growth compared with other African oil producers showed that oil accounted for only 35 percent of the country’s growth between 2002-07, compared to 86 percent for Angola. Agriculture accounted for an encouraging 27 percent of Nigeria’s growth, and services for 37 percent. However, manufacturing accounted

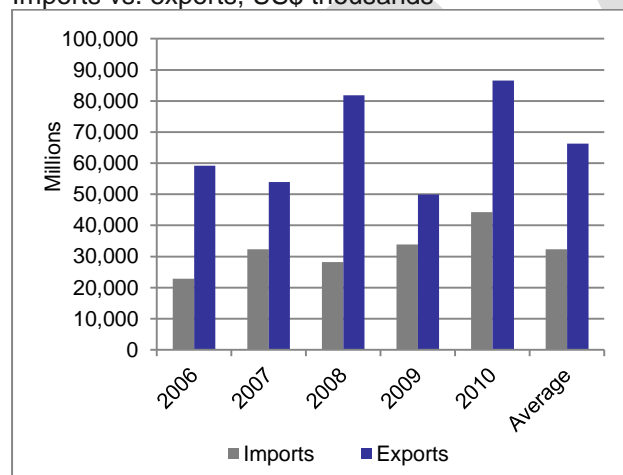
for a paltry one percent of total growth, which is concerning for the agricultural processing sector. The factors that are inhibiting the growth of the manufacturing sector in Nigeria will similarly affect agricultural processors, from the erratic availability of power to the high costs of transportation.

Top 10 exports

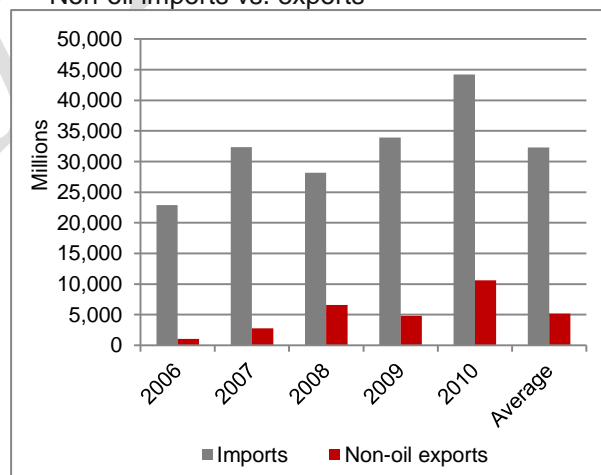
Exports by value, US\$ thousands



Imports vs. exports, US\$ thousands



Non-oil imports vs. exports

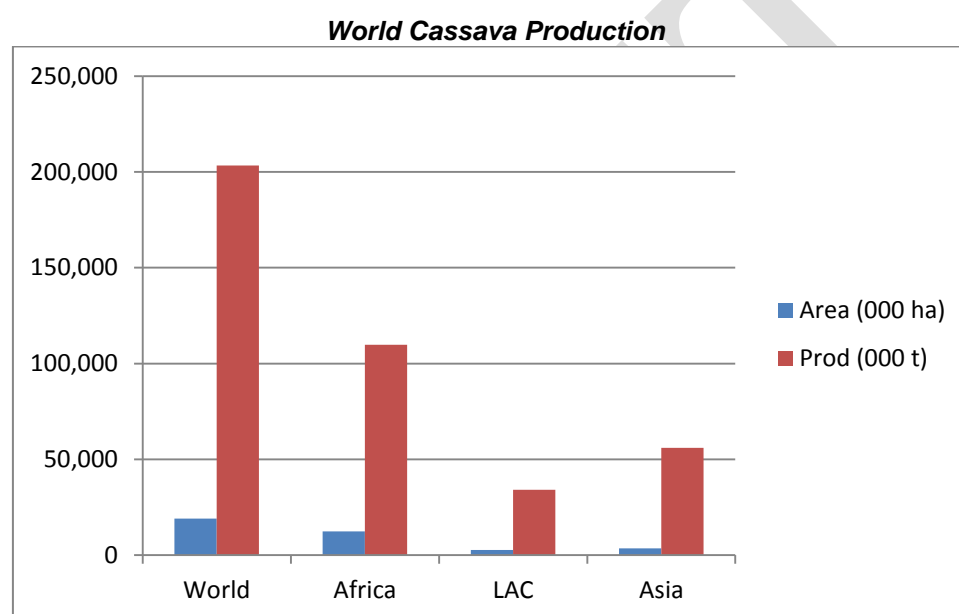


Source: ITC data, MARKETS II analysis

Chapter A: The Context

1. Global Context

Cassava is the third most important source of calories in the tropics after rice and maize. The broad agro-ecological adaptability of cassava and its ability to produce reasonable yields where other crops cannot makes it an important crop for household food security. More than 50 percent of the world's cassava crop is cultivated in Africa (6,486,000 hectares) with Nigeria and the Democratic Republic of Congo (DRC) as its major producers. In fact, Nigeria is the world largest producer of cassava with 19 percent of the total world production—estimated at 45 Mt. Nearly 90 percent of the cassava produced in Sub-Saharan Africa is used for food. In the DRC, cassava constitutes 54 percent of the total energy intake and in Nigeria 16 percent. In Latin America and the Caribbean, human consumption accounts for 42% and the remainder is used as animal feed, starch, or other cassava derivative products.



Source: Cassava International Market Profile, FAO.

After Africa, East Asia has the next two largest cassava producing countries—Thailand with 25 Mt, followed by Indonesia with 22 Mt. Both Vietnam and China are growing in strength, producing between 8 and 9 Mt per year. India is Asia's third highest producer. India augmented their cassava production by 30 percent between 2006 and 2010 due to an increase in the use of cassavas as feed. In Latin America and the Caribbean (LAC), cassava production has remained stable at 35 Mt per year.

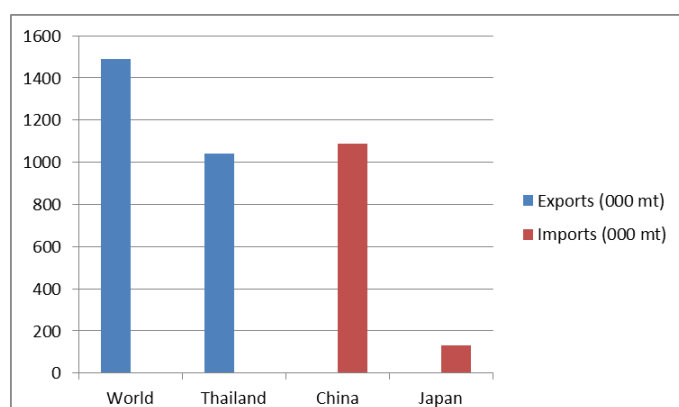
2. Uses

Apart from its use as staple food—either fresh or processed—animal feed is the second largest market for cassava. An estimated 25 percent of the global cassava production is used as feed ingredient for livestock, poultry, and fish farming. The variation between regions is striking with cassava use for feed estimated at 17 percent in Africa and 42 percent in Latin America. Prior to the 1992 Common Agricultural Policy (CAP) reform, the European Union was the main importer of dried cassava chips and pellets. The CAP reform, however, lowered cereal prices in the EU, providing an incentive for greater grain use by the feed industry and thus reducing demand for cassava. However in recent years, the use of cassava in animal feed in Asia has grown rapidly.

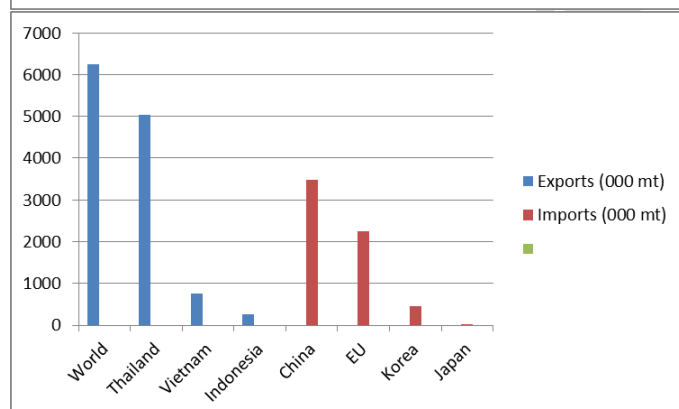
3. Trade

Cassava is highly perishable due to its high water content and must be processed or consumed within 48 hours after harvest. As a result, trade across borders of fresh cassava is limited. Only an estimated 10 percent of the global cassava production is traded in processed form, such as dried cassava chips and pellets, starch and flour, and other derivatives.

Global trade in dried cassava products amounts to the equivalent of over 24 Mt roots, 19Mt of which are exported from Thailand. The largest importer of dried cassava product is China. China imports a total volume of close to 15 Mt, most of which in which a large proportion is used for ethanol production due to the Chinese Government's decision to stop using cereal products to produce ethanol.



Cassava starch and flour exports and imports (2004).
(Source: FAOSTAT)



Cassava chips and pellets exports and imports (2004).
(source: FAOSTAT)

4. Nigerian Context

Despite the fact that Nigeria is, with 19 percent of the global cassava production, the largest cassava producer in the world, yields are low and the crop is not competitive in terms of international prices.²

Though the conversion of cassava into food products, such as gari and fufu is common, the industrial use of cassava for the production of HQCF, glucose syrup, and starch is low. There are only a handful of processing plants operating in Nigeria and all operate below their installed capacity. This is partially explained by the high costs of fresh cassava roots, transportation, and energy. Where gari and fufu producers can transfer the high cost of production to the consumer, producers of HQCF and starch cannot. These producers compete with cheaper cassava products from countries, such as Thailand and Vietnam along with flour and starches from other crops like maize and wheat. Competing against

² Cassava yields in Nigeria are very low, below 10 mt/ha, compared to yields in Thailand which are over 20 mt/ha. Low yields and a non-existing supply chain in Nigeria make fresh cassava roots expensive.

cheaper imports minimizes Nigerian processors' ability to recuperate the high costs of production by passing on those costs to the consumer.

The Government of Nigeria (GON) rolled out the Agricultural Transformation Agenda (ATA) in early 2012 which lays out a very ambitious program to revitalize the cassava sector using the value chain approach. The Nigerian cassava production is expected to rise to 51 Mt by 2015. The industrial use of cassava for the production of HQCF, starch, and other derivatives are expected to increase through the help of the importation of several new cassava processing units and the duty-free importation of cassava milling equipment.

One of the GON's key strategies to revitalize the cassava sector is to push toward substituting cassava flour for wheat flour in bread. By 2015 it is hoped that all locally produced bread will contain 40 percent cassava flour. This substitution would save Nigeria around \$ 800 million in foreign exchange by 2015.

Year	Wheat import Mt	Flour Equivalent Mt	Substitution rate	Net Wheat flour Mt	Import substitution Mt	US \$ savings (million \$)
2012	4.2	2.93	10%	2.63	0.78	200
2013	4.5	3.15	20%	2.52	1.23	314
2014	4.7	3.29	30%	2.30	1.71	436
2015	5.0	3.50	40%	2.10	2.27	801

Source: USDA, Gain Report, Cassava Inclusion in Wheat Flour, 2/24/2012.



The Honourable Minister of MARD presenting cassava bread.

Agricultural Financial Services: A Crosscutting Activity

Nigeria's agricultural sector lacks adequate capital at every level: too little investment in processing, limited working capital for intermediaries, and few appropriate financial products, such as leasing and smallholder credit, to address farmers' needs. At the same time support to Nigeria's financial institutions has been substantial, with loan guarantee funds and credit schemes from Central Bank of Nigeria (CBN) and other donors.

The biggest challenge stakeholders face when trying to access credit is the inability of financial institutions to provide credit at the producer level. From the banks' perspective, producers are unorganized and transaction costs are high. Even when adopting a value chain approach to finance, banks and processors face side selling by farmers which can result in loan defaults.

Challenges

The main challenges in agricultural finance can be summarized as follows:

- Record-keeping by small-scale farmers is rare. This limits the ability of commercial bank staff to analyze the profitability of prospective loans.
- Banks believe agricultural lending is risky and unprofitable.
- Most commercial bank staff do not understand agricultural lending. They knowledge from conventional banking to agricultural lending, leading to problems such as approving loans after the agricultural season is nearly over.
- Smallholder farmers tend to be unorganized and lack group cohesion to access credit from lending institutions.
- Agreements between farmers, buyers and banks are not respected by all parties, resulting in a breakdown in trust and inefficiencies in the value chain.

Solutions

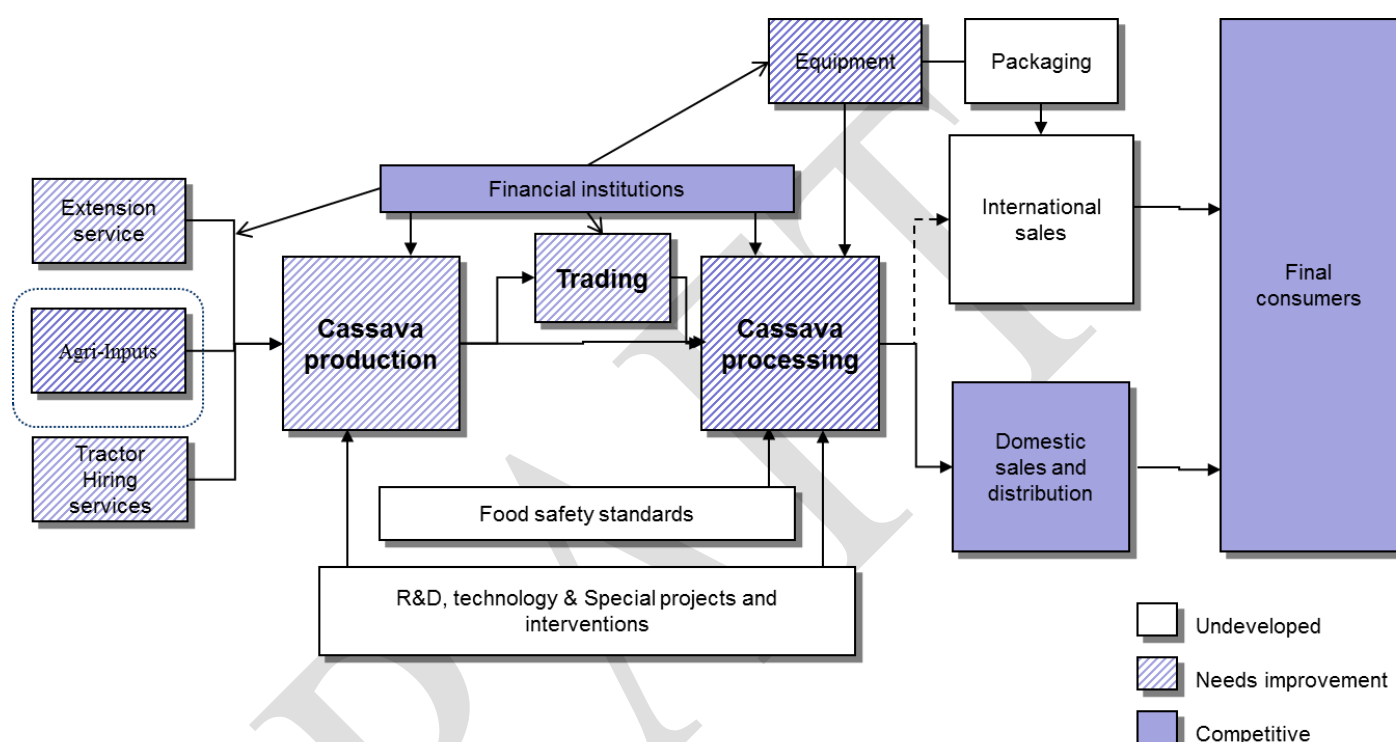
The challenges in agricultural finance are many, and so the solutions are complex. Some ideas for where to focus efforts include:

- Build farmer capacity for basic record keeping and business skills.
- Train commercial bank staff on agricultural lending, including crop cycles, cost of production, risk management and profitability models.
- Support farmer group formation and train on group dynamics and the benefits of membership.
- Support understanding of the advantages of pricing and off-take arrangements between farmers and processors, and the long-run benefits of honoring contracts.
- Support development of standard warehousing arrangements and a regulated commodity exchange.
- Support deregulation of crop and other agricultural insurance.
- Support the rollout of the Nigerian Incentive Risk Sharing Agricultural Lending (NIRSAL), CBN's new strategic new guarantee mechanism.
- Strengthen private sector distribution of inputs, with oversight and regulation by the government.

Chapter B: Cassava Value Chain

1. Cluster Map

Based on the results from the value chain survey, the cassava value chain team developed the following cluster map to demonstrate the areas that are undeveloped or need improvement.



Source: Cassava value chain group, "Draft action plan for cassava value-chain development for Nigeria," Federal Ministry of Agriculture and Rural Development 2011; MARKETS II analysis.

2. Crop Budgets and Waterfall Diagram

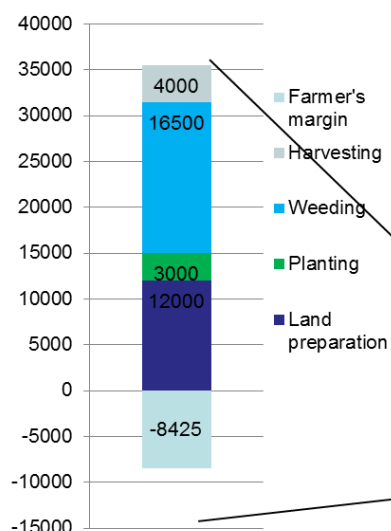
Based on the value chain survey data, two scenarios were constructed to calculate market profitability for farmers with, and without, mechanization for their farms. In the first scenario the farmer does not have access to mechanization or inputs such as fertilizer, crop protection chemicals, or improved cassava cuttings. In this worst case scenario the farmer will harvest about eight tons of cassava make a loss.

Value Chain Dynamics – manual cultivation

- Fresh roots destined for gari producers

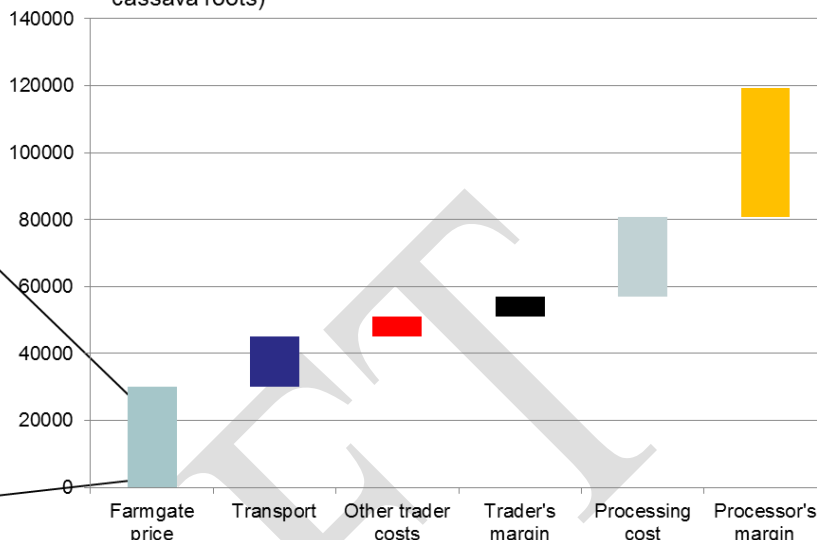
Production costs

(Share of production costs for cassava roots)



Value distribution

(Relative costs of producing 1 ton of gari from 3t of cassava roots)



The above diagram depicts a cassava farmer that sells to gari processors. Gari processing is generally a profitable business and has relatively high farm gate prices for fresh roots that are passed on to the consumer. This is in sharp contrast to the producers of HQCF and starch who compete with low cost cassava derivatives from Asia or other sources of starch such as maize or potato.

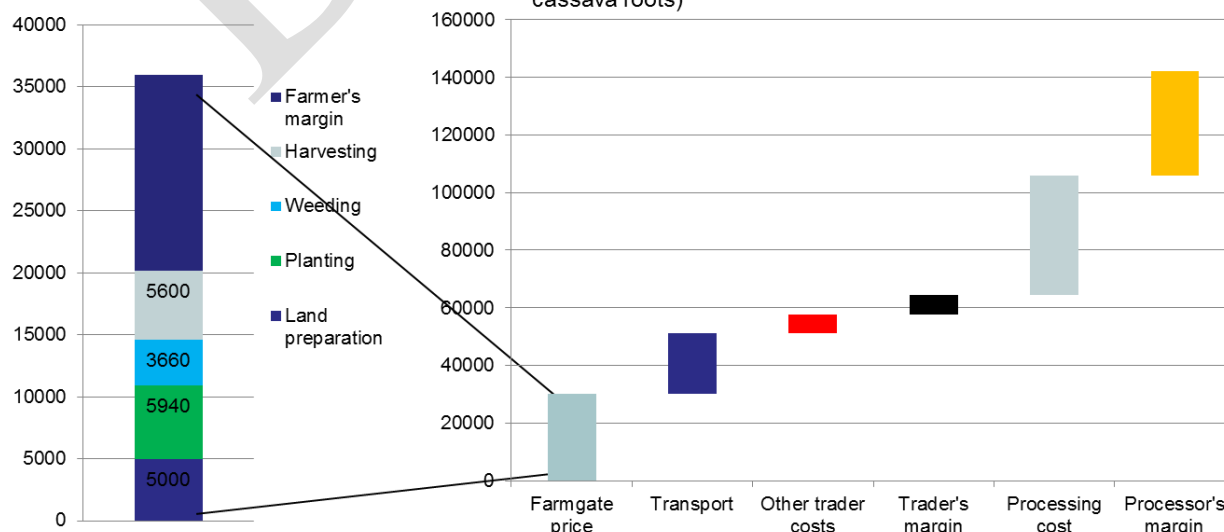
In the second scenario, the same farmer has access to tractor service for land preparation and uses inputs at recommended rates. In the scenario below the farmer makes healthy profit.

Value Chain Dynamics – mechanized and inputs

- Gari processing offers the highest return to farmers and processors

Value distribution

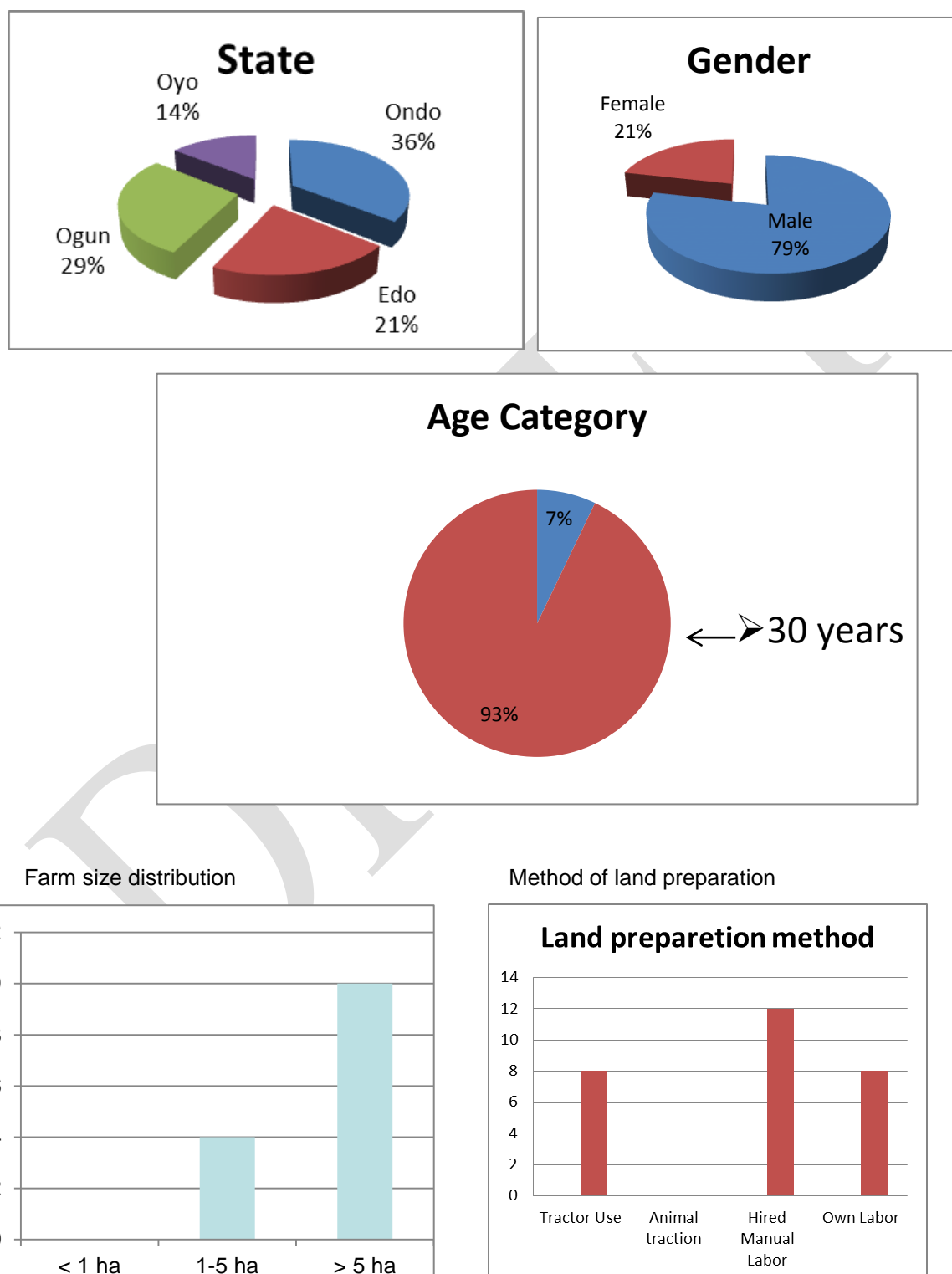
(Relative costs of producing 1 ton of gari from 3t of cassava roots)



3. Survey Findings

3.1. Producer Survey

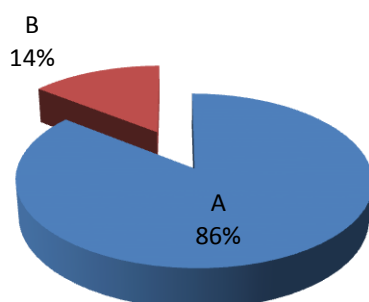
A total of fourteen cassava farmers were interviewed in four states. In addition to the key informant interviews, nine focus group discussions were held with 40 farmers to confirm interview findings and solicit additional comments.



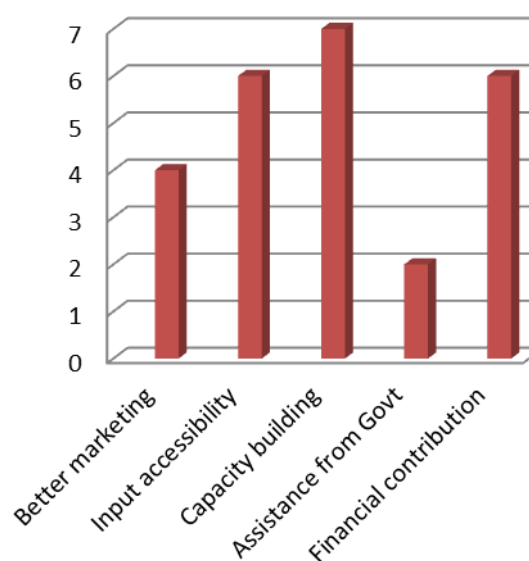
None of the interviewed farmers had less than one hectare. Ten out of fourteen farmers reported farming more than five hectares. Eight farmers used mechanized land preparation in combination with own or hired labor.

The majority of the farmers belong to farmer groups or associations. The biggest benefit reported in holding a membership with an organization was capacity building in the form of training. It was also noted that inputs were more easily available when farmers form groups as it was easier to be granted small loans.

Farmer group membership

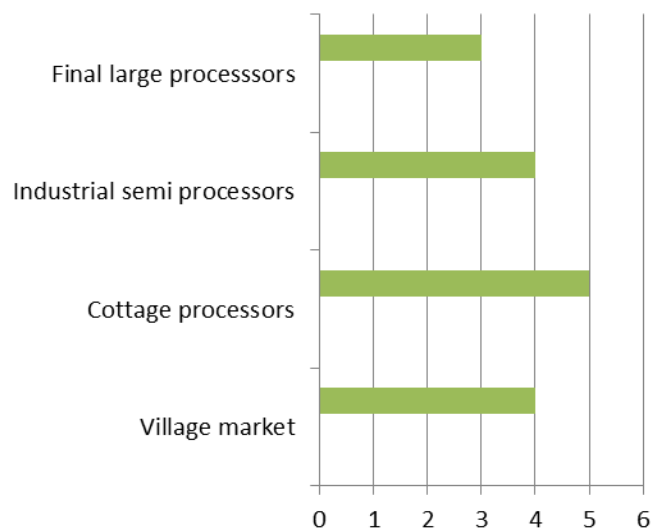


Membership benefits

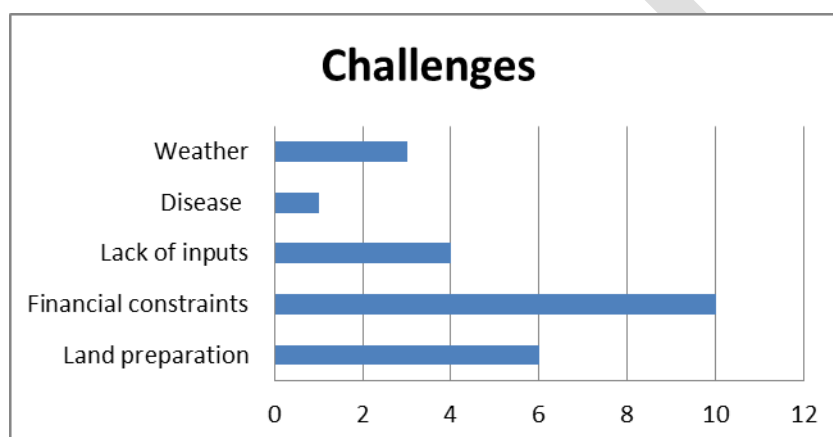


There are four main outlets for fresh roots, the final large processors, industrial semi processors, cottage processors, and village markets. Farmers by and large prefer to sell to small gari and fufu processors or in village markets where they can obtain higher prices for their product. Sales to large industrial processors occur but the prices offered by the industrial processors are lower than the other outlets.³

³ For instance in September 2012 cassava producers could sell one mt fresh roots for 13,000 Naira to gari and fufu producers. Whereas, producers received 8,000 Naira from Matna Foods (an industrial starch manufacturer). The competitive advantage of large processors is that they absorb large quantities compared to cottage industry processors.

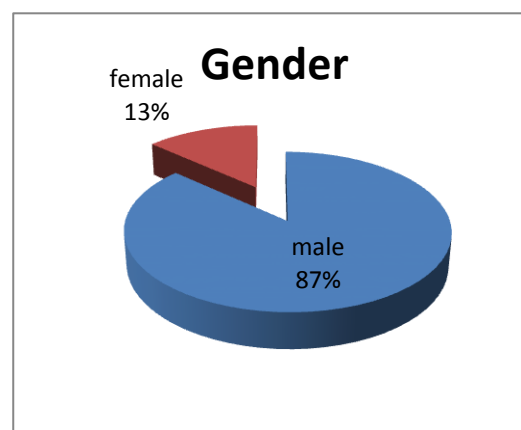
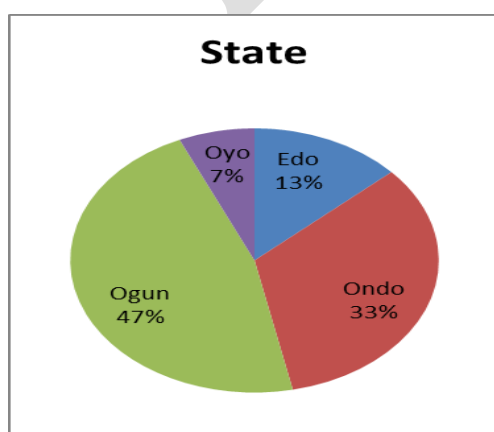


When farmers were asked about the major challenges they face, access to finance and mechanization were consistently cited. This confirms the earlier stated scenarios where without mechanization, at least for land preparation and low input use; cassava cultivation is not profitable nor is it competitive.

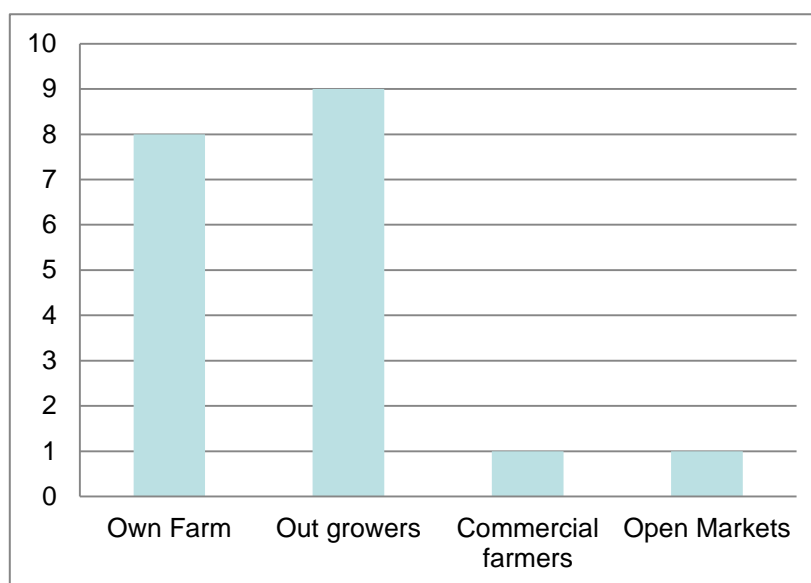


3.2. Processor Survey

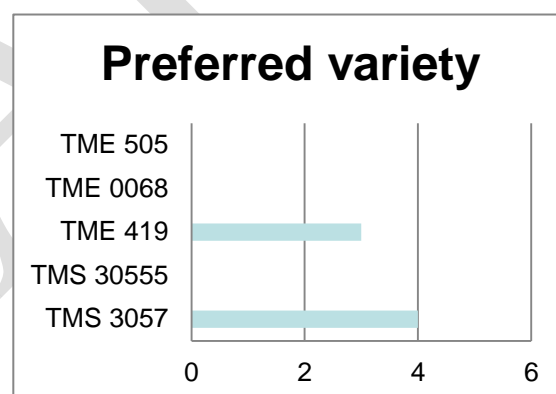
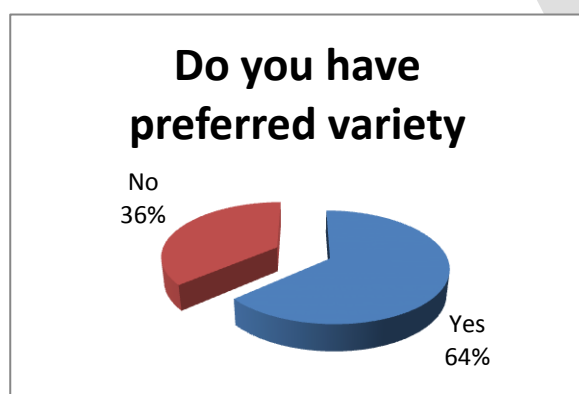
A total of 15 cassava processors were surveyed in four states. The processors ranged from large industrial processors such as MATNA Food and EKHA Agro to small producers of fufu and gari.



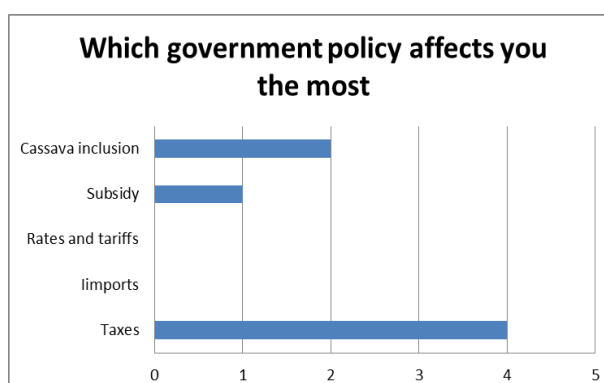
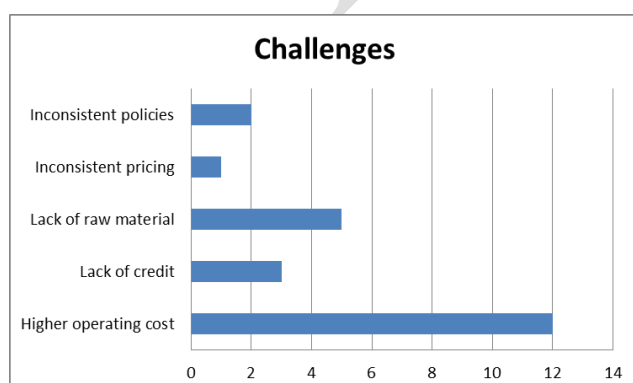
Most processors use out growers or produce cassava on their own farms. Very little is sourced from the open market.



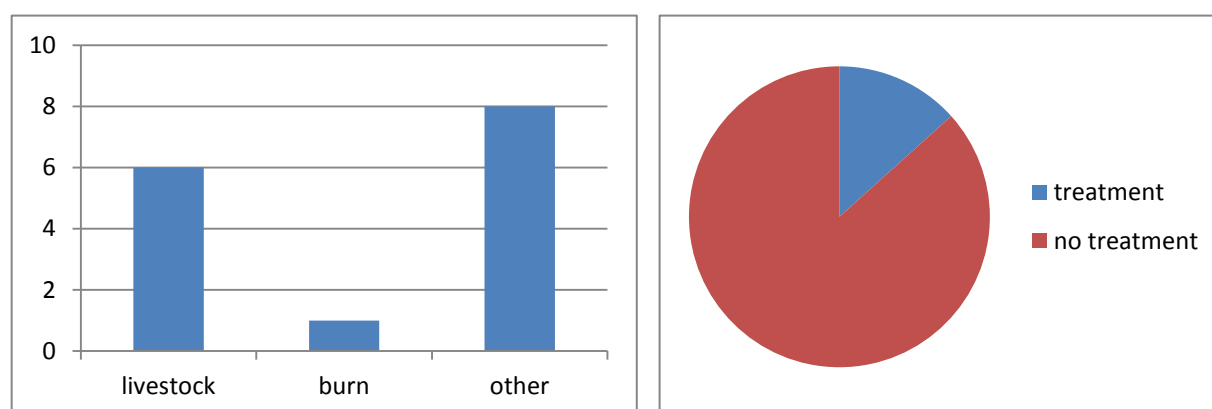
The majority of the processors reported that they did prefer some varieties over others but not all could name their preferred variety.



When asked about challenges, most processors reported the high operating costs, particularly energy costs and a lack of year round raw material. Asked about what government policies affects their business the most, the majority reported import of cheap starch and flour and high cost of taxation (both formal and informal).



Asked about byproducts, six processors reported that they gave the peelings away as animal feed or people collected them. Surprisingly, all six processors reported that this was free of charge. One processor reported that they burned the peelings. Another disposal method included leaving it on the soil.



Only two processors (EKHA Agro and MATNA food) treat effluent before discharging. All the smaller processors just let it drain untreated. This poses a potential health hazard due to the presence of cyanide in the effluent.

3.3. Focus Group Discussions

The cassava value chain team conducted eight focus group discussions with female processors, male and female farmers, youth farmers and traders.

A recurring question from participants was what MARKETS II would do to change the market. Most cassava value chain actors have seen projects come and go with little change.

A critical finding was the disconnect in the perceptions of market constraints. Processors complained about a lack of fresh roots whereas cassava producers mentioned a lack of demand.⁴ This disconnect between perceptions of demand and supply could be overcome by improved access to market information and improved market information systems.

⁴ One producer group mentioned that they have left cassava unharvested for three years because lack of demand.

Chapter C: Choices

At the end of the value chain survey, seven half day validation workshops were organized. These workshops were attended by 75 value chain stakeholders representing all sectors. The workshops were highly interactive with a good level of participation and lively discussions. Apart from the validation of survey results, stakeholders were asked to formulate strategic priorities which could be used to guide MARKETS II activities during the coming years.

For the cassava value chain the following strategic priorities were identified:

Priority	Justification / Business case	Suggested actions	Thematic focus
<ul style="list-style-type: none"> • Increase in farm productivity and reduce cost of production 	<ul style="list-style-type: none"> • Nigerian cassava is not competitive due to low yields and high labor costs. • Starch and HQCF producers cannot afford the purchase of fresh roots at current market prices. 	<ul style="list-style-type: none"> • Promote the use of the newly released high yielding varieties • Develop sustainable production and distribution of improved cuttings • Intensify farmer training in modern production techniques through the farmer school approach 	<ul style="list-style-type: none"> • Inputs • Technology • Capacity building • Youth and gender
<ul style="list-style-type: none"> • Create strong linkages between farmers and input/service providers 	<ul style="list-style-type: none"> • Private sector is lacking in downstream distribution and inputs are not available at village level • Farmers don't know where inputs are available • Mechanization especially in land preparation and harvesting are key to reducing costs 	<ul style="list-style-type: none"> • Work with the private sector on innovative distribution models to cover the last mile • Encourage the establishment of public/private sector committees at state level to address distribution issues • Facilitate the growth of mechanization service provision. • Inventory of cassava harvesting equipment and see if the technology can be adapted to Nigerian conditions 	<ul style="list-style-type: none"> • Inputs • Technology • Capacity building • Youth and gender • ICT
<ul style="list-style-type: none"> • Create strong market linkages 	<ul style="list-style-type: none"> • Farmer knowledge of cassava markets is limited. • There is a new group of fresh root traders emerging 	<ul style="list-style-type: none"> • Identify existing markets of small, medium, and large processors and link them to farmers • Develop a market information system for 	<ul style="list-style-type: none"> • ICT • Capacity building • Youth

	that harvest fresh roots and sell to processors	cassava farmers <ul style="list-style-type: none"> Facilitate regular stakeholder meetings Look closer at the emerging traders and see if it can be replicated 	
<ul style="list-style-type: none"> Lower transportation cost from farmer to processors 	<ul style="list-style-type: none"> Transportation of fresh roots to the processor is a major cost Because of its perishability harvested roots need to be transported and processed in 48 hours thus offering the farmer little negotiating powers with transporters 	<ul style="list-style-type: none"> Pilot processing centres in communities where fresh roots are turned into chips which are dry, less bulky' and easier to transport Introduce graters, chippers, and flash dryers developed by International Institute for Tropical Agriculture (IITA) to mechanize the process Facilitate the organization of women and youth groups for training in technical and business skills Do a feasibility study with processors to change their processing flow from fresh root intake to chips intake Facilitate access to finance for investing in processing and storage 	<ul style="list-style-type: none"> Women and youth Access to finance Capacity building Technology deployment

Chapter D: Conclusions and Actions

Although Nigeria is the largest cassava producer in the world, cassava for industrial uses is not competitive against cheap cassava products from Asia. This is mainly due to high farm gate prices for fresh roots caused by low yields, high transportation costs to processing sites, and high energy costs for processing.

Low crop yields are caused by insufficient adoption of improved practices and the non-availability or non-adoption of improved varieties and other inputs. Lack of mechanization for land preparation and harvesting as well as high transportation costs (due to its bulky nature) drive down profitability. Industrial processors of cassava for HQCF and starch cannot be competitive or offer the same prices for fresh roots as gari and fufu processors. In addition, industrial processors are crippled with high energy and high transportation costs if they arrange to buy at farm gate.

To make the Nigerian cassava value chain more competitive, transportation costs must be lowered through intermediate processing at the farm or village level, yields must increase through improved varieties and fertilizer use, and labor costs must be lowered through mechanization.

The Cassava Value Chain Survey Validation Workshop was attended by a good cross section of the cassava stakeholders surveyed. The workshop came up with the following strategic priorities for MARKETS II to remove some of the constraints.

- Increase farm productivity and reduce cost of production. MARKETS and BtM2 facilitated farmer access to improved stems and trained networked farmers on best agronomic practices, demonstrating that Nigerian cassava yields can reach international levels of 20 – 24 mt/ha.
The availability of improved stem cuttings remains the key bottleneck to farm productivity. MARKETS II, together with Partnership Initiative for the Niger Delta (PIND) and Catholic Relief Services (CRS), the National Agricultural Seed Council (NASC) and local NGOs, will address this constraint by piloting decentralized commercial, and sustainable production and distribution of improved variety stem cuttings. MARKETS II has recently, in collaboration with Making Cents, adapted the National Agricultural Enterprise Curriculum (NAEC) training for cassava producers and will in collaboration with PIND and other interested stakeholders start a program of Master Trainer trainings in order to disseminate this curriculum as widely as possible.
- Create strong linkages between farmers and input/service providers. As was discovered during the survey, there is a disconnect between producers and SME processors. While producers complain about the lack of markets, SME processors complain about a lack of raw materials. During the survey a new group of entrepreneurs was discovered that actually connect processors with the farmers and harvest cassava on demand at the farms. MARKETS II should study this business model closer and see if it can be replicated in other cassava growing areas.
- MARKETS and BtM2 have always focused on the large industrial processors like EHKA AGRO and MATNA FOOD. However, our survey data shows that processors of gari, fufu and other food products are very dynamic and pay farmers better prices than the large industrial processors. Demand for food products like gari and fufu is increasing due to continued urbanization. MARKETS II should research emerging SME processors and implement interventions, such as food safety training, improved packaging and marketing, introduction of new technologies (see case study in Annex II), and environmental safety in dealing with effluents and waste products. This would

complement other MARKETS II activities in the light of the recent interest by PIND to work together with Ekha Agro and Matna.

- Lower the transportation cost from farmer to processors. Transportation cost from the farm to the processor is a major expenditure that involves moving water and waste products. The economics of moving cassava will improve if there is intermediate processing at the farm or village level because it would remove the burden and cost of transporting wet roots. The technology to process cassava at a local level is available at IITA in the form of mechanical graters, chippers, and flash dryers. MARKETS II could pilot several village- or cooperative-based intermediate processing platforms, where this intermediate processing could be tested. These pilot programs would be ideal environments to promote youth and women's engagement in income generating activities. However, industrial processors like Matna and Ekha Agro are built for the intake of fresh cassava roots and would need to make alterations in their product flow to cater to the intake of dried chips.

Annex I: Survey Methodology

Timing

The Value Chain Analysis survey for seven commodities was carried out between August 14th and September 7th, 2012. The survey was preceded by a weeklong training on value chain principles, MARKETS II intervention areas, and survey administration. During this period survey questionnaires were developed. Data analysis began on September 10th and continued through October 10th. Seven half day validation workshops were organized between September 17th and 20th and included active participation by of a cross section of the stakeholders interviewed during the survey.

The team

The entire MARKETS II technical team, including subcontractors, participated in the study. Seven senior Nigerian consultants served as value chain team leaders. A total of 25 people were involved in the survey work with administrative and management support from MARKETS II. Two international consultants also assisted a key phases of the process—one for training and start-up and one for data analysis, stakeholder validation and final document preparation.

Value chain teams and states covered

Eleven teams were formed to cover the seven commodities across 20 states. Each team contained at least one female staff member to make sure that gender-sensitive questions could be addressed in mixed or all female focus groups without problems.

Commodity	Number of teams	States
Cassava	1	Oyo, Ondo, Edo, Ogun
Cocoa	2	Cross River, Ondo, Oyo, Osun
Rice	2	Kano, Jigawa, Kebbi, Ebonyi, Anambra, Benue
Sorghum	2	Kano, Katsina, Kaduna
Aquaculture	1	Edo, Osun, Oyo, FCT, Lagos, Ogun
Maize	2	Kaduna, Plateau, Nassarawa
Soybean	1	Nassarawa, Kaduna, Niger, Benue

Target value chain stakeholders

The following stakeholders were targeted:

Producers (small and large scale)
Processors (small and large scale)
Service providers (mechanization, spraying, transporters, etc)
Policy makers (MARD, ADP)
Input dealers
Traders

Survey tools

The teams used both structured key informant interviews and focus group discussions to carry out the research. The table below presents the number of people interviewed through both key informant interviews and focus group discussions.

Commodity	Interviews
Maize	65
Rice	89
Soybean	40
Cocoa	85
Aquaculture	78
Sorghum	89
Cassava ⁵	41

Service providers

All the MARKETS II service providers (5) were subcontracted to assist the value chain teams with setting up meetings with key informants and focus groups and to help with translation where necessary. They were specifically instructed to identify key informants among crop association members, non-associated farmers, marketers, processors, input dealers, extension agents, grain purchasers, women and youth groups, technology and service providers, financial institutions and wholesalers and retailers and to assemble focus groups consisting of male and female farmers, youth, extension agents, small processors, cooperative groups, traders etc. Due to time constraints, it is possible that the selection of producers was skewed towards producers that worked with MARKETS and BtM2 before. The service providers played a key role in the survey process and made rapid progress possible.

Data input and analysis

Data input was done by a team of three people and supervised by a data analyst. Value chain teams sent completed questionnaires on a weekly basis to Abuja so that data input was a continuous process during the survey. However, template development and data input took longer than expected and, in some cases, delayed data analysis.

⁵ The number of actual interviews for cassava is disappointing but can be explained by the fact that it was a single team covering a large area. The same is true for the soybean value chain team.

Annex II: Case Study - Revolutionizing Gari Production

Gari is a partially gelatinized and roasted granular flour made from fresh cassava root. It is consumed either by soaking it in cold water and sweetening it to taste or by stirring it in boiling water to make a stiff paste that is eaten with traditional soups and stews. Gari is widely known in Nigeria and other West African countries. It is the most consumed and traded cassava food product. The wide consumption of gari has been attributed to its relatively long shelf life compared to other cassava products and it is easy to prepare.

Gari processing is tedious. It starts by transporting fresh cassava roots from the farm to the processing shed. This will often require carting heavy stacks of cassava on one's head multiple times or paying for expensive transport on bad roads in rickety vehicles. Arranging to peel the cassava is a social contract. It will usually take a day for six women with kitchen knives, paid N600 (\$4) each, to completely peel and wash a batch of cassava. The next step of grating and dewatering the cassava mash has been mechanized in many cassava growing areas of Nigeria, which has reduced its labor-intensity. The last step in production is the most difficult and is a combination of sieving, roasting (garifying), and packing. This tedious process has discouraged many young women from entering into gari production, leaving it to older women.



Traditional gari processing shed in Akure, Ondo State

Kola Adeniji, a mechanical engineer and entrepreneur, wanted to find a lasting solution to this problem. He designed a gari roaster with the capacity to process in one day what normally would require 15 women. The mechanical roaster runs on electricity or alternative energy sources. Through an agreement with the Oyo State Agricultural Development Programme, Kola used part of their building as his temporary processing factory. In 2011, Kola developed the gari roaster and other gari processing equipment. He installed his new equipment in his own factory - NIJI Farms. The proximity of NIJI Farms to



local farms enabled the company to purchase fresh cassava root at 22 percent less than prevailing market prices. The roots are processed into high quality gari and sells at less than what is sold in local markets. In a short period of time, NIJI Farms has reported a high financial turnover by developing creative and inventive products that helped improve gari labor inputs.

Annex III: Source of Growth

Resources account for the majority of growth in many of Africa's oil exporters, although Nigeria is more diversified

Real GDP growth by industry sector, 2002–07
%, 2000 \$ billion

